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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

Capital Budgeting: Do Private Sector Methods of Budgeting for Capital Assets Have Applicability to the Department of Defense

**By: Sean Donohue and
Lina M. Downing
December 2005**

**Advisors: Larry Jones,
Richard Dawe**

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**CAPITAL BUDGETING: DO PRIVATE SECTOR METHODS OF BUDGETING
FOR CAPITAL ASSETS HAVE APPLICABILITY TO THE DEPARTMENT OF
DEFENSE**

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Submitted in partial fulfillment of the requirements for the degree of

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from the

**NAVAL POSTGRADUATE SCHOOL
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CAPITAL BUDGETING: DO PRIVATE SECTOR METHODS OF BUDGETING FOR CAPITAL ASSETS HAVE APPLICABILITY TO THE DEPARTMENT OF DEFENSE

ABSTRACT

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I. INTRODUCTION

A. GENERAL

Since the tragedy of September 11, 2001, the military services have seen the tempo of operations increase almost exponentially as the wars in Afghanistan and Iraq have been prosecuted and, in large part, won. In addition to the thousands of brave men and women who have answered the nation's call to serve, these conflicts have been waged with a multitude of the military's capital assets. Assets like trucks, tanks, ships, aircraft, and other weapons systems, many of which are at or beyond their "useful" lives, will need to be replaced with new generations of equipment in order to maintain the nation's fighting forces as the best in the world. This situation, coupled with an environment of "transformation" within the Department of Defense (DOD), prompts this study of capital budgeting.

The ongoing replacement of DOD's capital assets, as well as other much needed capital investments, will likely have to take place during a time of decreasing, or at least "slow growing" resources, over the long term. In addition, the Department of Defense is in the midst of an era of "transformation" under Secretary of Defense (SECDEF) Donald Rumsfeld that calls for the modernization of DOD's business systems, as the budgeting system has already been modified during Rumsfeld's tenure. It has been argued that the Federal Government and other public agencies should adopt "corporate" methods of budgeting, to include the use of separate capital and operating budgets that are prevalent in the private sector. Significant changes would have to occur in the present system if private budgeting methods were adopted by DOD and other public organizations, but there are examples of public organizations that have made this leap, as the governments of New Zealand and Australia, as well as most of the states in the U.S. have at least adopted some private budgeting methods with varying degrees of success.

B. OBJECTIVE OF RESEARCH

The objective of this project is to examine the methods and principles used in capital budgeting, both in DOD and in private organizations. This project will also look at case studies of other public organizations that have adopted private sector budgeting methods, with a focus on budgeting for capital assets, in an effort to determine the feasibility of adopting these methods within DOD and other federal agencies. Finally, by considering both the case studies and recommendations made by the Government Accountability Office (GAO) and others, this project will discuss which private sector methods may have applicability to DOD and other federal agencies.

C. SCOPE, LIMITATIONS, AND ASSUMPTIONS

This project focuses on the capital budgeting principles defined by the Office of Management and Budget (OMB) and their application to DOD. It also analyzes the specific actions taken with respect to capital projects in the budgeting phase and planning phase of the capital programming process. Realizing that individual private organizations may vary in the way that they budget for capital assets, this project analyzes the most popular approaches used in corporate America and looks at how the private sector plans and manages risk. It further studies how the Fortune 500 companies execute capital budgeting. Additionally, it examines the impact of an organization's size and choice of methodology for capital budgeting. The case studies are analyzed with specific attention given to capital budgeting issues in an attempt to determine feasibility for DOD and other federal organizations. This project does not analyze political aspects of the current budgeting process nor does it discuss reforms that have already taken place in the acquisition and Planning Programming Budgeting and Execution (PPBE) processes.

D. RESEARCH QUESTIONS AND METHODOLOGY

The research questions this paper attempts to answer are as follows:

1. How do public organizations such as the Department of Defense budget for capital asset purchases?
2. How do private organizations budget for capital asset purchases?

3. Is it possible or appropriate to apply private organization capital budget principals to public organizations?
4. What private sector methods of capital budgeting can be used in DOD?
5. How do public organizations plan and manage risk regarding capital projects?
6. What private sector methods and practices have been adopted by other public organizations?
7. What private sector methods or practices have been adopted by DOD?

A literature review was conducted to answer these research questions. Information was gathered through various government homepages on the internet, government and literary publications with emphasis in capital budgeting for the private sector, and existing Naval Postgraduate School theses.

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II. CAPITAL BUDGETING ANALYSIS

A. DOD CAPITAL BUDGETING PRINCIPLES AND METHODS

The process of budgeting for capital assets in the Department of Defense (DOD) is a complex process with many moving parts. While DOD employs some of the same techniques for evaluating capital projects as organizations in the private sector do, such as cost-benefit analyses, it does not have a separate capital budget and must take many other factors into account when designing its plan for capital spending. The process of budgeting for capital assets in DOD, as well as other federal agencies and departments, is governed by rules set forth by the Office of Management and Budget (OMB), laws passed by Congress, and the Federal Management Regulations (FMR). Additionally, DOD proposals for new capital projects “must be supported by elaborate analytical justifications and reviewed and approved by hundreds of people all along the line from the lowest to the highest echelon” (Jones and Thompson, 1999). This section will define capital assets, examine the principles that DOD and other federal agencies use to budget for and justify capital asset acquisitions, and briefly describe the actions that take place in the planning and budgeting phases of the capital programming cycle. Finally, this section will examine the guide published by GAO titled “Executive Guide: Leading Practices in Capital Decision-Making.”

1. Definition of Capital Assets

Capital assets, as defined by OMB, are “land, structures, equipment, intellectual property, and information systems that are used by the Federal Government that have a useful life of two years or more” (OMB, 2003). Additionally, capital assets include not only the assets as originally acquired but also “additions, improvements, modifications, replacements, reinstallations, and major repairs, but not ordinary repairs and maintenance” (OMB, 1997). In the case of DOD, examples of capital assets include aircraft, ships, main battle tanks, office buildings, enlisted or officer housing, and weapons systems. For a more thorough definition, it is also useful to understand what assets are not considered capital assets. Any asset that DOD acquires with the intent of re-selling or any item that is acquired for physical consumption (such as supplies) is not

considered a capital asset. Human capital and intangible assets such as knowledge are, likewise, not considered capital assets. Finally, capital assets can be acquired through several different means. DOD can purchase, build, manufacture, lease (both operating and capital leases), or exchange capital assets (OMB, 2003).

2. Principles of Budgeting for Capital Assets

DOD must satisfy many requirements regarding capital assets before any capital spending requests are included in the President's Budget (PB). Once included in the PB, there is no guarantee that Congress will enact Budget Authority (BA) in the appropriations process for the purchase of any particular capital asset. Before any capital spending is included in the President's Budget, DOD must satisfy the principles of planning, costs and benefits, financing, and risk management requirements as set forth by OMB.

a. Planning

When planning for investments in capital assets, DOD must ensure that the following criteria are met:

- The asset must support the core missions of DOD.
- No other private or public agency can support the function more efficiently than DOD.
- The asset should support work processes that reduce costs, improve effectiveness, and make maximum use of commercial, off-the-shelf technology.
- The asset must demonstrate a return-on-investment superior to any other alternative. Returns can include improved mission performance, reduced cost, and increased quality, speed, or flexibility.
- The asset must reduce risk. This basically means that fully tested pilots or prototypes are pursued before proceeding with full funding for the end item.
- If the investment is planned for more than one asset (i.e., 100 Joint Strike Fighters), then it must be implemented in phases as narrow in scope as practicable, with each phase delivering a measurable net benefit independent of future phases.

- The asset should employ an acquisition strategy that allocates the risk efficiently between the Government and the contractor, uses competition, ties contract payments to performance, and takes advantage of commercial technology (OMB Circular A-11, Appendix J).

OMB considers it essential for DOD and other federal agencies to meet these criteria for capital investments. OMB uses this information to determine the feasibility of the investment, set the basis for full-funding, and for deciding whether the capital purchase has been justified well enough to be included in the PB (OMB, 2003).

b. Costs and Benefits

In addition to meeting the above criteria, DOD's justification for the purchase of any particular capital asset must include a cost-benefit analysis. The asset's total life-cycle costs must be compared to the benefits that it is expected to provide. However, as is the case for many of DOD's capital asset proposals, the benefits of the asset may be hard to define in monetary terms, which is why the focus is generally placed on life-cycle costs. Additionally, when comparing different capital projects, it may be determined that each asset provides essentially the same benefit. For example, if DOD is evaluating two competing designs (i.e., from two different contractors) for a new weapons system, even though the design may be different, the benefit provided by each one may essentially be the same. In these instances, DOD can conduct a cost-effectiveness analysis of the competing programs/assets (OMB, 1992).

The standard used in conducting cost-benefit analysis is net present value. This process involves assigning monetary values to the benefits and costs of the asset, discounting these values using an appropriate discount rate (set by OMB), and subtracting the sum of discounted costs from the sum of discounted benefits. Capital investments with a positive net present value are preferred to those with a negative net present value.

DOD may also conduct a cost-effectiveness analysis when justifying a capital asset proposal. As stated in OMB Circular A-94, "A program is cost-effective if, on the basis of life-cycle cost analysis of competing alternatives, it is determined to have the lowest costs expressed in present value terms for a given amount of benefits." This

type of analysis is used when benefits either can not be monetized or it is not practical to monetize the benefits. As noted previously, this is often the case for DOD weapons systems. However, when benefits can not be monetized, OMB encourages DOD to supplement cost-effectiveness analyses with information that quantifies the benefits in physical measurements or effectiveness measures (OMB, 1992). For example, DOD may quantify the benefits of a new aircraft in terms of increased readiness percentages, capability to deliver more ordnance than current aircraft, or lower maintenance costs.

c. Financing

OMB has established principles of financing that DOD must consider when proposing spending for capital assets. The principles include the following: (1) full funding, (2) regular and advanced appropriations, and (3) separate funding of planning segments (OMB, 2003).

Full funding refers to the Budget Authority (BA) required to complete a “useful segment” of a capital investment. Congress must appropriate the BA before DOD can incur obligations for the capital asset. A “useful segment” is “...a unit of a capital project that can be economically or programmatically useful even if the entire project is not completed” (GAO, 1998). Full funding ensures that all costs and benefits are taken into account at the same time that decisions are made by Congress to provide or not provide BA for a capital investment. Full funding also helps to ensure lower acquisition costs, prevent cancellation of projects, and ensure that enough funding is provided to maintain and operate the assets (OMB, 2003).

Full funding by regular appropriation in the budget year is recommended by Congress and GAO because it allows decision makers to make tradeoffs between competing capital projects as well as other spending purposes. However, this may result in “spikes” in the budget that are not good for DOD or Congress. Given the large dollar amounts required for many DOD capital asset acquisitions, this situation often presents itself. In situations like this, a combination of a regular appropriation in the budget year and some advance appropriations in subsequent years may be necessary to fully fund a capital project (OMB, 2003).

Planning for a capital asset should be funded separately from the actual purchase of the asset. DOD needs information in order to plan, develop designs, compute costs and benefits, and assess risk levels for capital projects. Most of this information comes from the Research, Development, Test, and Evaluation (RDT&E) process. Separate funding for RDT&E and procurement helps to ensure that costs, schedules, and performance goals are known prior to proceeding to actual procurement of the assets (OMB, 2003).

d. *Risk Management Requirements*

Risk management is an important aspect in the process of budgeting for capital assets. DOD must conduct a thorough risk analysis for each capital asset acquisition in order to minimize cost overruns, schedule problems, and assets that fail to perform as expected. Risk analyses should define how risks will be minimized, monitored, and controlled.

The information gained in RDT&E is the foundation for OMB and Congressional approval to purchase the asset and provides the basis for assessing risk. DOD should employ performance-based management systems, such as earned value management, during the procurement phase in order to ensure both contractor and government goals are being met. Performance-based systems can identify early indications of problems, possible corrective actions, and insight required to change original goals so that the capital investment can be completed. These systems also give decision makers critical information that allows them to determine whether a capital investment should be continued, modified, or terminated. Finally, DOD must “...ensure that the necessary acquisition strategies are implemented to reduce the risk of cost escalation and the risk of failure to achieve schedule and performance goals” (OMB 2003).

3. *Planning Phase of the Capital Programming Process*

Budgeting for capital assets is not possible without a planning process that aids an agency in deciding what needs to be done and then how it will be accomplished. Detailed and comprehensive planning is even more necessary when trying to manage limited budgetary assets, which is the situation with most federal agencies, including the

Department of Defense. Budgeting and planning, therefore, must be linked together in order for success. “There can be no good budget without a plan, and there can be no executable plan without a budget to fund it” (Capital Programming Guide, 1997).

The planning phase is the nucleus of the capital budgeting process used in most federal agencies. Decisions yielded by the planning phase are applied throughout the budgeting and other phases, and information from the other phases feeds back into the planning phase. The six steps in the planning phase are 1) strategic and program performance linkage, 2) baseline assessment and identifying the performance gap, 3) functional requirements, 4) alternatives to capital assets, 5) choosing the best capital asset, which focuses on benefit/cost and risk analysis, and 6) the agency capital plan, which is to include an inventory of existing capital assets (President’s Conference Staff Budget Staff Paper, 1998). Each of these steps will be discussed in greater detail below.

a. Strategic and Program Performance Linkage

The Government Planning and Results Act (GPRA) established the legal requirements for federal agencies to develop strategic plans and link these plans to requests for budgetary resources. The capital programming process (a.k.a. capital budgeting) is an important piece of any agency’s strategic planning process. Quality strategic plans should detail the agency’s needs for particular capabilities, identify the capital assets that are needed to accomplish the goals of the agency’s plan, and delineate the results that these capital assets will produce. The agency’s strategic plan also needs to take into account the estimated budgetary resources that will be available and define goals and objectives for each major program based on the agency’s mission (Capital Programming Guide, 1997).

In 1996, the Government Accountability Office (GAO) produced a study that described three practices that are extremely important for strategic planning to have the desired impact. The three practices are as follows:

- Involve all the pertinent stakeholders to include Congress, the Administration, customers, service providers, employees, and interest groups.

- Take an assessment of the agency's internal and external environments in an effort to anticipate future difficulties so that appropriate adjustments can be made.
- Align the agency's activities, processes, and resources to support results that are in line with the mission.

These practices are similar to the Strengths, Weaknesses, Opportunities and Threats (SWOT) analyses that private corporations use in their strategic planning processes.

Agency strategic plans should produce goals and objectives for its programs. These goals and objectives, embodied in an agency annual performance plan, should detail how outputs will be achieved and describe the role that particular capital assets will play in achieving the desired outcomes. This information essentially defines “how much bang we are getting for the public's buck” (OMB, 1997). The better an agency is able to link a capital asset to a strategic, mission-related outcome, the more likely they will be able to justify the resource request associated with that capital asset.

b. Baseline Assessment and Identifying the Performance Gap

The Office of Management and Budget has established that federal agencies should conduct planning through Integrated Project Teams (IPT) that brings together several disciplines to evaluate the capabilities of existing capital assets. This evaluation will help provide information needed for identifying performance gaps between current and planned results. Additionally, the assessment of current assets should include information concerning functionality, life-cycle costs and the affordability of life-cycle costs, risk, and the agency's ability to manage risk. This information for every agency program enables the agency to examine their entire collection of capital assets when trying to define alternatives to fill performance gaps.

The IPT, as previously mentioned, should include several disciplines. These disciplines should include budgetary, financial, procurement, and users all led by a program manager (Capital Programming Guide, 1997). The Federal Acquisition Streamlining Act (FASA) and changes to the Federal Acquisition Regulations (FAR) have done much to promulgate the IPT approach to capital asset planning.

c. Functional Requirements

If it is determined that an agency's current capital assets cannot bridge the performance gaps, the gaps need to be defined in terms of additional performance requirements that need to be met. The agency must take care not to define these requirements in terms of specific equipment, but rather in terms of mission requirements, capabilities needed, cost objectives, and constraints. As these functional requirements are being generated, the capabilities of other assets and/or processes must be considered. For example, it may be determined that a new, technologically advanced capital asset is needed to meet a program's goal. However, if the other assets that support this "new" asset have obsolete technology which will not "work" with the new asset, simply buying the new asset may not enable that program to meet the desired requirements.

This step in the planning process should also involve internal users and external customers in the process of determining requirements. Additionally, other agencies may have already acquired assets which could be used to meet requirements. This is especially critical for large, complex acquisitions of capital assets. The Department of Defense is moving in this direction with programs such as the Joint Strike Fighter and MV-22. When defining functional requirements, the agency needs to keep the emphasis on what is required to meet the needs of the mission, as defined by the strategic plan, and limit the number of "nice to haves" (OMB, 1997).

d. Alternatives to Capital Assets

Once the requirements have been defined, the agency must now determine whether a new capital asset is needed to meet the requirement. In general, given the expense involved with the purchase of many capital assets, agencies should spend considerable effort to determine if there may be procedural or process improvement actions that can be taken to meet the defined requirement. The Office of Management and Budget has suggested that federal agencies should answer the following questions prior to making the decision to purchase new capital assets:

1. Does the investment in a major capital asset support core/priority mission functions that need to be performed by the Federal Government?

2. Does the investment need to be undertaken by the requesting agency because no alternative private sector or governmental source can better support the function?
3. Does the investment support work processes that have been simplified or otherwise redesigned to reduce costs, improve effectiveness, and make maximum use of commercial, off-the-shelf technology (COTS)?

Only if the answer to all of these questions is “yes,” should the agency proceed with an acquisition of a new capital asset. Even if all questions are answered positively, the agency is still encouraged to consider all viable alternatives to meet the requirement including the use of human assets. However, if the decision is made to request purchase authority for new assets, this request needs to be supported by a detailed cost-benefit or cost effectiveness analysis. The methods used in these analyses will be further described in the discussion of the Budgeting Phase (Capital Programming Guide, 1997).

e. Choosing the Best Capital Asset

The IPT needs information from management to determine if resources will be available for the purchase of new capital assets when the decision to purchase new capital assets has been made. Emphasis needs to be placed on innovative proposals from private industry contractors that make full use of competition between vendors. The IPT should also explore the use of commercial off-the-shelf technology and non-developmental items (NDI) in an effort to mitigate costs associated with purchasing a particular capital asset (OMB, 1997).

Choosing the best capital asset for an agency’s mission needs requires the IPT to exhaustively search the market and then, once the “best” choice has been discovered, develop a smart acquisition plan for the asset. The strategy employed to conduct market research, while it may vary among programs, should be designed to generate as many feasible alternatives as possible from numerous (where possible) and different contractors/vendors (OMB, 1997).

After a list of alternatives has been compiled, cost-benefit analyses need to be conducted, taking into account acquisition costs and numerous other life-cycle costs as

well as the benefits that the asset will provide. Where possible, these benefits should be monetized and compared with the costs associated with the asset. The time value of money should also be included in the analysis. Specific and detailed attention should be placed on obtaining realistic and credible estimates of life-cycle costs of the asset. The specific methods employed to conduct the cost-benefit analysis are covered in greater detail in the discussion of the budgeting phase below (OMB, 1997).

Risk must be taken into account and planned for with every capital asset acquisition. Risk comes in numerous forms to include schedules' risk, cost risk, risk of project failure, and interdependency issues with other assets/programs. When developing a strategy to mitigate and manage risk, the IPT needs to consider all sources of risk and high risk should only be accepted when it can be justified by high expected returns from the asset (OMB, 1997).

The planning phase of the capital programming process must also include the development of plans for contract type, competition strategies, and management of capital assets during their life-cycle. The plans set forth in these areas are no less important than those discussed above and are critical to acquiring an asset that will truly meet the needs of the agency while delivering the required mission-related results (OMB, 1997).

f. The Agency Capital Plan

The final step in the planning process is the development of an agency capital plan. This capital plan should be part of the larger strategic plan for the agency and should detail the long-term decisions made with respect to the agency's capital asset portfolio. OMB currently encourages the federal agencies to develop these plans but there is no "requirement" for agencies to have them.

The Agency Capital Plan is the most important output of the planning phase. However, the agency should not treat the plan as "set in stone" but rather a living document that can change as plans and priorities change over time. This document should serve as the agency's primary document for capital asset planning and can also be

used to create budget justifications to Congress. This comprehensive plan should include, at a minimum, the following items:

- Statement of the agency's mission, strategic goals, and objectives
- Description of the planning phase
- Baseline assessments and identification of performance gaps
- Justification of spending requests for proposed new assets
- Staffing requirements
- Timing issues
- Plans for proposed capital assets once purchased and in use
- Summary of the risk management plans

Finally, the Agency Capital Plan should include a detailed description of how each asset in the agency's portfolio will enable the agency to achieve its outcome and output goals (that are defined in the strategic plan).

4. Budgeting Phase of Capital Programming Process

The budgeting phase of the capital programming process, which can also be called the "justification" or "approval" phase, formally begins when the agency, such as the Department of Defense, submits its request for capital asset acquisitions to the Office of Management and Budget. OMB will then make its recommendation to the President for the construction of the President's Budget. This phase ends when Congress appropriates funding and OMB apportions funds to DOD for the purchase of capital assets. If the decision is made not to fund the acquisition, it could return to the planning phase for submission the next year or the capital investment may be subject to further DOD review to determine if another investment better suits DOD strategic goals (Capital Programming Guide, Section II). The specific steps in the budgeting phase are briefly described below:

- **Step 1: Agency Submission for Funding:** In this step, the agency submits its budget, which includes the portfolio of capital assets approved by the agency head such as Secretary of Defense (SECDEF) in the case of DOD, to OMB for approval. The submission should be in harmony with the principles of budgeting for capital assets detailed above. OMB will then analyze the agency's submission, often asking the agency to provide additional information, and make its recommendation to the President.

- **Step 2: Pass Back:** In this step, the agency is notified of OMB's recommendation to the President. If the agency's justification for the asset is not in compliance with the principles of budgeting for capital assets, they may have to make substantial changes to their initial request to include changes to funding levels, performance goals, and financing alternatives. The agency also has the option to appeal (reclama) OMB's recommendation to the President.
- **Step 3: Agency Revision:** The agency may have to make adjustments to its proposal for capital spending due to changes that took place during the pass back phase.
- **Step 4: Approved for the President's Budget:** Once the agency's proposal has made it through OMB scrutiny, it is now included in the President's budget proposal to Congress.
- **Step 5: Congressional Approval/OMB Apportionment:** If Congress approves the proposal, it appropriates Budget Authority and OMB apportions the BA to DOD and the other federal agencies. After apportionment, Congress, OMB, and other parties within the agency monitor the procurement process and implement corrective actions if necessary (OMB, 1997).

5. **GAO Executive Guide: Leading Practices in Capital Decision-Making**

In fiscal year 1997, the federal government spent \$72.2B on capital assets. Of this amount, \$52.4B, or roughly 73 percent, was spent for defense-related capital assets. Federal agencies, including the Department of Defense, are challenged with demands to improve performance in fiscally restrained environments. As a result, it is increasingly important for federal agencies to make effective capital acquisition choices, implement those choices well, and maintain the capital assets embodied in these choices over the long term.

GAO developed the "Executive Guide: Leading Practices in Capital Decision-Making" as a supplement to OMB's more specific Capital Programming Guide. The Executive Guide "identifies attributes that are important to the capital decision-making process as a whole, as well as capital decision-making principles and practices used by outstanding state and local governments and private sector organizations." The guide also provides information about the Coast Guard in an effort to determine the applicability of these principles and practices to a federal agency. The Executive Guide is not meant to be a detailed rulebook, rather it is meant to be illustrative in nature and

serve as a complement to the Capital Programming Guide. In constructing the Executive Guide, GAO identified and studied several government and private organizations that are recognized for outstanding capital decision-making practices. The organizations studied are as follows:

- State of Maryland
- State of Minnesota
- State of Missouri
- State of Virginia
- State of Washington
- Dayton, Ohio
- Montgomery County, Maryland
- Phoenix, Arizona
- Ford Motor Company
- General Electric
- Mobil Corporation
- Texas Instruments

The Executive Guide divides the desired capital budgeting attributes into five broad principles containing twelve practices. The break down is as follows:

Principle 1: Integrate organizational goals into the capital decision-making process.

Practice 1: Conduct a comprehensive assessment of needs to meet results-oriented goals and objectives.

Practice 2: Identify current capabilities including the use of an inventory of assets and their condition, and determine if there is a gap between current and needed capabilities.

Practice 3: Decide how best to meet the gap by identifying and evaluating alternative approaches (including non-capital approaches).

Principle 2: Evaluate and select capital assets using an investment approach.

Practice 4: Establish review and approval framework.

Practice 5: Rank and select projects based on established criteria.

Practice 6: Develop a long-term capital plan that defines capital asset decisions.

Principle 3: Balance budgetary control and managerial flexibility when funding capital projects.

Practice 7: Budget for projects in useful segments.

Practice 8: Consider innovative approaches to full up-front funding.

Principle 4: Use project management techniques to optimize project success.

Practice 9: Monitor project performance and establish incentives for accountability.

Practice 10: Use cross-functional teams to plan for and manage projects.

Principle 5: Evaluate results and incorporate lessons learned into the decision-making process.

Practice 11: Evaluate results to determine if organization-wide goals have been met.

Practice 12: Evaluate the decision-making process and re-appraise and update to ensure that goals are met.

a. Practice One: Conduct a Comprehensive Assessment of Needs to Meet Results-Oriented Goals and Objectives.

Prior to conducting a needs assessment, leading organizations have identified their mission and crafted results-oriented goals that will help the organization fulfill its mission. Based on the organization's stated goals, both short-term and long-term, leading organizations conduct a needs assessment to determine the resources that will be necessary to achieve the goals and, thus, fulfill the organization's mission. The needs assessment should take into account the organization's internal and external environments. The organization's internal strengths and weaknesses should be considered as well as external factors that may have an impact on the organization's operations. Essentially, leading organizations seem to follow the advice of Harvard Business School Professor Michael Porter and recognize the strategic importance of conducting a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis as part of their comprehensive needs assessment. Finally, leading organizations realize that a needs assessment is not static and so they define the time period that it covers (usually 5-6 years into the future) and management agrees on how often the needs assessment should be updated (usually in conjunction with the organization's budget cycle) (GAO, 1998).

b. Practice Two: Identify Current Capabilities Including the Use of an Inventory of Assets and Their Condition, and Determine if There is a Gap Between Current and Needed Capabilities.

The most important aspects of defining current capabilities, with respect to capital assets, are knowing the answers to the following questions: (1) What capital assets does the organization have? (2) What is the material condition of these assets? (3) Are our current assets meeting the needs of the organization?

The leading organizations that GAO surveyed gather and track information that allows them to answer the above questions, thus helping them to identify gaps between current capabilities and their needs. Most of these organizations use various automated asset inventory and tracking systems to gather this critical information. For example, one of the state governments that GAO surveyed uses “an inventory system that includes not only the list of capital assets but also their condition” (GAO, 1998). It is also important to note that sub-unit or operating department systems need to integrate with “corporate” systems so that upper-level management decision-makers can have a “total picture” of the organization’s capital assets and their condition.

By periodically cataloging the condition and performance of the organization’s capital assets, decision-makers of leading organizations are able to evaluate current capabilities, plan future asset purchases, and calculate maintenance costs on current assets. A comparison of the organization’s needs and current asset capabilities allows management to identify capability gaps and make determinations about what resources (assets) are needed to fill these gaps.

c. Practice Three: Decide How Best to Meet the Gap by Identifying and Evaluating Alternative Approaches (Including Non-Capital Approaches).

The third practice that leading organizations exhibit during the capital budgeting process is they consider a number of alternatives that would potentially serve their needs and fill capability gaps, to include non-capital alternatives. In considering these alternatives, these organizations use various evaluation methods including, but not limited to, net present value, internal rate of return, and payback period. Decision-makers should also consider the different funding sources that are available such as

floating equity and raising debt. For public organizations, this may mean making purchases in useful segments in order to deal with budgetary regulations and constraints (GAO, 1998).

The organizations studied in the Executive Guide give careful consideration to whether a new capital asset is needed to meet requirements and goals. Management takes into consideration whether or not the organization possesses the necessary skills and competencies to meet identified needs. Alternatives such as leasing, joint-ventures, and outsourcing should be considered prior to making the decision to purchase new capital assets. For example, two private companies that GAO studied make use of extensive outsourcing for needs that are not core competencies of their respective companies. Additionally, a leading state government was able to identify several programs to privatize and achieve significant budgetary savings as a result (GAO, 1998).

If the decision is made that a capital asset is needed to meet requirements, leading organizations first assess whether currently possessed assets will meet the need before deciding upon a new purchase. Usually, these leading organizations choose new capital investments only after other alternatives have been thoroughly explored. This practice allows them to minimize the amount invested and mitigate risks to the organization (GAO, 1998).

d. Practice Four: Establish Review and Approval Framework

GAO states, "...establishing a decision-making framework that encourages the appropriate levels of management review and approval, supported by the proper financial, technical, and risk analyses, is a critical factor in making sound capital investment decisions" (GAO, 1998). The levels of review and the quantity of analysis required often have to do with the size, cost, and strategic importance of the proposed project. Large and expensive projects, as well as those that are critically important to the organization's mission, are usually approved by higher levels of management and require much more detailed analyses than do smaller or "less important" capital projects.

As part of the review and approval process, organizations should construct an “investment package” that details the project’s costs, benefits, risks, and delivery schedules. The investment package should also detail how the capital project links to the organization’s mission and how it fills the identified needs. Not all organizations use the term “investment package,” yet most of the organizations in GAO’s study prepare these types of materials for decision-makers. In the Department of Defense, these packages are analogous to the Milestone briefings that are presented to the Milestone Decision Authority (MDA) (GAO, 1998).

e. Practice Five: Rank and Select Projects Based on Established Criteria.

Leading organizations select capital projects based on criteria they have established ahead of time. Usually, this process also involves a ranking of competing projects because, generally, there are not enough resources to proceed with every viable capital project and, thus, only the “best” or “most profitable” are selected. The pre-established criteria often relate to the organization’s strategic goals. By linking decision-making criteria to the organization’s strategic goals, leading organizations ensure that chosen capital projects are contributing to the overall success of the organization (GAO, 1998).

One of the state governments that GAO studied puts this practice to work by using a collaborative decision-making process and extensive communication in their budgeting process. The Office of Administration of this Midwestern state reviews all proposed projects and then meets with cabinet members to select projects that meet pre-established criteria and the state’s funding constraints. By the end of the meeting, each agency official leaves knowing whether or not his or her proposed capital project has been accepted. As one official stated, “You might not win, but you understand why you lost” (GAO, 1998).

f. Practice Six: Develop a Long-Term Capital Plan That Defines Capital Asset Decisions.

The organizations that GAO studied realize the importance of developing long-term capital plans which they use to ensure that the organization is implementing its

goals with respect to capital investments. The capital plans also enable decision-makers to establish long-term priorities. The long-term capital plans established by leading organizations are not static; rather, they are linked to the organization's strategic plan, and any changes to the capital plan are driven by strategic decisions (GAO, 1998).

The development of long-range capital plans has several benefits. Officials in one state government stated that they require all state agencies to develop capital plans, and this requirement has forced decision-makers to consider the long-term implications of their capital investment decisions as well as reduced the number of "surprise" capital projects. A long-term capital plan also helps leading organizations refine a project's scale and costs over many years, thus lessening the probability for large cost overruns. Finally, most state governments that GAO studied require all capital project requests to be part of the agency's long-term capital plan. The same is true for the private organizations that GAO studied. They too require that planned capital expenditures be aligned with long-range business plans.

g. Practice Seven: Budget for Projects in Useful Segments.

A strategy that leading public and private organizations have adopted to deal with the problems associated with capital investments in capped or "tight" budget environments is that they budget for capital projects in useful segments. Simply put, this means that if the cost of a capital project totals more than can be budgeted in any one year, the project is then broken down to useful segments that can be paid for in multiple budget years. This is different than incremental funding in that with incremental funding the organization does not always end up with a useful item. In the context of the Department of Defense, a useful segment may be ten aircraft or one ship. OMB has defined and provided guidance for fully funding useful segments of a project in the Capital Programming Guide (GAO, 1998).

However, for this strategy to be successful, the organization must have the mechanisms in place to be able to produce reliable cost estimates for capital projects. Many of the state and local governments that GAO studied use a process called "predesign" to provide decision-makers with comprehensive cost and scope data before the decision is made to commit substantial financial resources to the capital project. This

is somewhat analogous to the R&D process used in DOD. The results of the predesign process should produce information such as project description, impacts on operating costs, a detailed project cost plan, and a description of how the proposed capital project relates to the agency's strategic goals and objectives (GAO, 1998).

The Coast Guard divides its capital acquisitions into stand-alone segments and typically requests full funding for each stage over a number of years. For example, the first year's request for funding may include one ship and the associated spare parts reserve. Even if the federal budget became "extremely tight" and no other funds were appropriated to the Coast Guard for follow-on ships, they would still have a usable asset.

h. Practice Eight: Consider Innovative Approaches to Full Up-Front Funding.

Some leading organizations that GAO studied have developed alternative methods to full funding capital projects in constrained budget environments. These methods include outsourcing, partnerships, and using savings accounts to accumulate the necessary funds for capital investments over a period of years.

As one may expect, the private organizations that GAO studied have extensively used outsourcing. However, the practice is becoming increasingly popular in federal agencies as well. An electronics company that GAO studied outsources the production of computer chips that are used in its electronic products. Chip manufacturing is extremely capital intensive and this electronics company has determined that the company they outsource to is better able to perform this function. Better said, the company has decided to focus on its core competencies and outsource those functions that are not competencies. DOD has outsourced the management of many military housing areas and mess facilities in an effort to achieve cost savings that may eventually be used for new capital projects (GAO, 1998).

In another federal agency, Congress has allowed agency officials to establish an investment component within its working capital fund so that the agency can set aside portions of annual appropriations to save for capital investments. GAO states

that allowing federal agencies to do this “may promote better planning and make it possible for agencies to budget for the full cost of such investments within constraining caps” (GAO, 1998).

Partnerships allow two or more organizations to share the risks associated with financing a capital project. In public/private partnerships, a private sector organization shares the risk with one or more governmental organizations. This is a benefit to the governmental agency because it requires them to provide less up front funding for a particular project. The private sector organization is usually reimbursed through a system of user payments.

i. Practice Nine: Monitor Project Performance and Establish Incentives for Accountability.

A capital investment project’s success is usually measured in terms of whether it was completed according to schedule, came within its budgeted costs, and provided the intended benefits. Monitoring a project’s performance in relation to cost, schedule, and performance goals increases the chances of success for capital projects.

Leading organizations have procedures in place to identify and mitigate risks such as scope changes and poor cost estimates. Project plans include baseline figures for project cost and proposed schedules as well as the designation of milestones, targets, and risks. By having a project plan in place and periodically monitoring a project’s performance, these organizations can detect potential problems early and institute corrective actions where necessary (GAO, 1998).

The organizations that GAO studied also hold capital project managers responsible for meeting established cost, schedule, and performance goals. Changes from established program baselines are thoroughly investigated and revisions are instituted when necessary. However, it should be noted that managers should not be held accountable for variations that are out of their control. Such variations could include weather restrictions for construction projects and other “fact of life” changes. Closely related to managerial accountability is the issue of incentives (GAO, 1998).

The leading organizations in GAO's study provide significant incentives for managers and project teams to meet goals. Many of the private sector organizations in the study make extensive use of financial incentives. In private companies, the status of large capital projects is usually reported to the Board of Directors and this arrangement provides accountability for the project outside of the project team as well as incentives to meet cost, schedule, and performance goals. Private organizations in GAO's study also impose managerial consequences on managers that do not meet goals. This may mean dismissal, reassignment, or assignment to positions with less responsibility (GAO, 1998).

While many public organizations maintain that they do not have the same financial incentive or accountability "tools" as private companies, some state and local governments have devised several unique methods of accomplishing these tasks. A local government created managerial incentives for controlling costs by denying additional funds above those that were budgeted for the project. Another state agency established incentives for good performance by assigning project team managers and members to future projects based on past performance in other projects (GAO, 1998).

j. Practice Ten: Use Cross-Functional Teams to Plan for and Manage Projects.

All the public and private organizations in GAO's study use teams to plan and manage capital projects. Most put together multi-disciplinary teams consisting of members from several key functions such as budgeting, engineering, purchasing, marketing, and other functions. The team is typically established very early in the project's life-cycle and remains in place for the duration of the capital project to ensure continuity. A corporate executive from one of the private firms in GAO's study commented on the importance on having the "right" people on the team. "...they must be knowledgeable, willing to trade off leadership roles, and able to plan work and set goals in a team setting." A public official added that "a sense of ownership and the drive of the team committed to a project were key factors in the successful completion of a project" (GAO, 1998).

k. Practice 11: Evaluate Results to Determine if Organization-Wide Goals Have Been Met.

A more comprehensive approach for determining a capital project's success is to judge its performance using measures that not only take into account the financial success of the project, but also reflect a variety of other outcomes and perspectives. To implement this "balanced" approach, leading organizations develop both financial and non-financial success factors that link to the organization's strategic goals. Lower-level managers can then use these factors to develop project-specific measures as well as use them to develop and assess business unit performance. The unit measures are then combined to compile a "scorecard" for the organization as a whole. The "balanced scorecard" approach enables organizations to connect individual performance as well as project performance to the achievement of organizational objectives.

Another approach for determining if a capital investment is adding to the organization's success is conducting audits at the completion of a capital project. The goal of this process is to judge the process and determine whether the users of the capital investment were satisfied. These audits are often done via surveys, and the feedback from the surveys is incorporated into the design of subsequent capital projects (GAO, 1998).

l. Practice Twelve: Evaluate the Decision-Making Process: Re-Appraise and Update to Ensure that Goals are Met.

GAO found that most organizations do not evaluate their capital budgeting processes on an ongoing basis. Most, if not all, of the organizations they surveyed usually revise their procedures in response to some negative event or crisis. According to the surveyed organizations, both public and private, they often felt that drastic changes needed to be effected for them to continue successful operation. One state government found that many of its agencies took a "piecemeal approach" to capital planning and budgeting, only evaluating its processes when something negative happened. In response to this, the state government focused on better communications with agencies, began

using project management teams, and instituted a performance budgeting framework. The state's revised system has gained them national acclaim from the National Performance Review (GAO, 1998).

In response to the Government Performance and Review Act (GPRA), the Coast Guard has made several changes to its capital planning practices. They implemented a working group to develop a long-term capital plan based on the guidance set forth in OMB's Capital Programming Guide. In the past, the Coast Guard usually just replaced assets on an incremental basis as assets wore out. The agency now recognizes that its capital assets are related and part of a single system. This viewpoint has led the Coast Guard to plan for capital projects with the goal of "getting the best system performance at the lowest system cost" (GAO, 1998).

The bottom line is that while organizations tend only to make changes in response to internal crises, they should consider implementing a system of ongoing evaluation of their capital budgeting processes so that when changes need to be made, they will not be large-scale.

B. PRIVATE SECTOR CAPITAL BUDGETING PRINCIPLES AND METHODS

This section will describe the capital budgeting process for organizations in the private sector. Specifically, the section will define capital budgeting, discuss the primary capital budgeting decision criteria, introduce some guidelines that are used to make capital spending decisions, and explain how risk is incorporated into the capital budgeting process in the private sector.

1. Capital Budgeting in the Private Sector

Capital budgeting is the area of financial management that establishes the criteria for investing in long-term projects. More often than not, these projects involve the acquisition of property, plant, and equipment. Simply put, capital budgeting is "The decision-making process with respect to investment in fixed assets" (Keown et al, 2005). This decision-making process helps private organizations determine whether or not to accept or reject a proposed capital investment project. A fixed asset, also known as a capital asset, is defined as "A long-term, tangible asset held for business use and not

expected to be converted to cash in the current or upcoming fiscal year, such as manufacturing equipment, real estate, etc.” (<http://www.investorwords.com>). Since cash can be classified as a “benefit” to the private firm, one can combine the two definitions above and restate the definition of capital budgeting as the decision-making process that is used to purchase assets that provide long-term benefits to the organization.

2. Capital Budgeting Criteria

Competition is intense in the private sector marketplace. Once a firm comes up with a profitable investment project, competitors often rush in which results in reduced prices and profits. Due to this, private sector firms must have a strategy to consistently generate ideas for new capital projects. Without a consistent flow of new capital projects (or projects that improve existing products), the firm will not be able to grow, or even survive, in the private sector marketplace. Like most public sector organizations, many private firms have Research and Development (R&D) operations or departments that are tasked with coming up with proposals for new capital projects and designing improvements to existing products (Keown et al, 291-292). How are the capital project proposals generated by R&D evaluated to determine profitability for the private firm?

Few methods are available to execute capital budgeting. These include the simple payback period method (PB), the net present value method (NPV), the profitability index (PI) method, and the internal rate of return method (IRR). Over the past fifty years, the focus on a particular method has shifted almost every decade. The internal rate of return and the net present value techniques slowly gained in popularity until today, where they are now used by virtually all major corporations in decision-making (Keown et al., 2005).

In addition to the existing methods, computer modeling recently became available to financial managers. This technique bridges the gap between theory and practical application.

Choosing the appropriate methodology to execute capital budgeting is very important. This review will discuss a few aspects of capital budgeting: net present value,

the internal rate of return, the pay-back method, computer modeling, and risk considerations. Furthermore, it will introduce how the Fortune 1000 companies execute capital budgeting.

a. Net Present Value

The discounting methods of cash flow are based on discounting cash inflows and outflows to their present values. Therefore, this technique considers the time value of money. Clark, Hindelang, and Pritchard (1989) define the net present value computation as follows:

$$NPV = \sum_{t=0}^n \frac{CI_t}{(1+k)^t} - CO_0$$

CO = present value of the after-tax cost of the project

CI = the after-tax cash inflow to be received in period t

k = appropriate discount rate or hurdle rate

t = time period

n = useful life of asset

The goal of using this formula is to determine whether the net present value is equal to, less than, or greater than zero. If the NPV is positive, then the project is expected to yield a return higher than the required rate. If NPV is zero, then the yield and required rate are expected to be equal. Lastly, if NPV is less than zero, then the yield is expected to be below the required rate. The significance of the net present value results is that, normally, only those projects with a value equal to or greater than zero will be considered. This NPV formula was widely used in the 1990s. The formula being used today, according to Keown et al, (2005), has been slightly modified, yet the goal remains the same.

$$NPV = \sum_{t=1}^n \frac{FCF_t}{(1+k)^t} - IO$$

FCF= annual free cash flow in time period t

K = the appropriate discount rate; that is, the required rate of return or cost of capital

IO = the initial outlay

N = the project's expected life

As Clark et al (1989) observed, "We support our preference for the NPV model as the unique evaluation technique that consistently helps firms to maximize common shareholder's wealth positions. Whenever mutually exclusive projects are being evaluated, only the NPV model will consistently show the firm the project or set of projects that will maximize the value of the firm." Today's view of using the NPV model for its benefits has not changed much. "Acceptance of a project using the NPV criteria adds to the value of the firm, which is in harmony with the private firm's goal of maximizing shareholder value" (Keown et al, 2005).

The use of the NPV method when selecting projects seems the most appropriate, because it takes into account cash flows as opposed to accounting profits. It also considers the time value of money, which makes the calculation more realistic. Lastly, the NPV method is sensitive to the true timing of benefits received from a project. The only difficulty with the NPV method is accurately determining the exact required rate of return. To overcome this obstacle, many firms use the cost of capital as the required rate of return. This rate is the most emphasized in current finance practices.

The NPV capital budgeting decision method is superior to simpler capital budgeting decision methods for four major reasons:

1. It deals with free cash flows rather than accounting profits.
2. It is sensitive to the true timing of benefits received from a project.
3. It incorporates the time value of money which supports a rational comparison of a project's benefits and costs.
4. Acceptance of a project using the NPV criteria adds to the value of the firm, which is in harmony with the private firm's goal of maximizing shareholder value (Keown et al, 2005).

b. Internal Rate of Return

The internal rate of return is another discounted cash flow method used for capital budgeting decisions. By definition, the internal rate of return (IRR) is that rate which exactly equates the present value of the expected after-tax cash inflows with the present value of the after-tax cash outflows (Clark et al, 1989).

The internal rate of return is not easily identified. Few tools are available to determine the internal rate of return. One of these tools is identifying the discount factor. This calculation consists of dividing the initial outlay by the yearly average expected cash inflows. Upon finding the discount factor, it is compared against compound interest and annuity tables to determine what percentage corresponds to that specific discount factor. The percentage selected is then used as a starting number to multiply the cash inflows by until a NPV close to or greater than zero is found. Therefore, if the percentage selected does not give a NPV of zero or greater, then the number is adjusted up or down until it reaches the targeted value.

Once the IRR of a project has been determined, it is then compared to the required rate of return. The purpose is to decide whether or not the project is acceptable. If the IRR is equal to or greater than the required rate of return, then the project is acceptable. Of course, projects can also be ranked in accordance with IRRs. The project with the highest IRR would be rank number one, the second highest IRR would be ranked number two, and so forth.

There are cases where the sign of the cash inflows varies over the life of the project. This type of situation brings about variable internal rates of return. When encountering multiple IRRs over the life of a project, other evaluative calculations are used to account for the variability. This methodology, however, is very seldom practiced.

The Internal Rate of Return method requires estimating a rate of return based on the discount factor. Each discount factor does not have a unique corresponding rate. Therefore, financial managers use an “approximation” in selecting the IRR. The NPV calculation is more precise, and therefore is preferred over the IRR methodology for capital budgeting.

The internal rate of return (IRR) criterion helps private firms determine a capital project's rate of return. "Mathematically, it is the discount rate that equates the present value of the (cash) inflows with the present value of the (cash) outflows" (Keown et al, 2005). A capital project is accepted by the firm if its IRR is greater than the firm's required rate of return (i.e., cost of capital). On the other hand, a capital project is rejected if its IRR is less than the firm's required rate of return. The IRR method exhibits the same advantages as the NPV method and yields similar accept-reject decisions. However, the reinvestment rate assumption imbedded in the IRR method is inferior to that of the NPV method (Keown et al, 2005).

c. Pay-Back Method

The pay-back method uses the number of years of cash flow required to recapture the original cost of an investment, normally disregarding salvage value (Osteryoung, 1979). There are two approaches to calculating the payback value. The first method is used when annual cash flows are equal in value. For example, if the initial outlay of a project is \$20,000, the life of the project is five years, and the annual cash flow is \$2,000 then the payback calculation is as follows:

$$\text{Payback} = 20,000/2,000$$

$$\text{Payback} = 10 \text{ years}$$

The second method of calculating the payback value is applicable when the annual cash flows are unequal. In this case, two calculations take place: the annual cash flow and the cumulative cash flow. The values of the cumulative cash flows are used in calculating the payback. Table 1 illustrates uneven cash flows and the payback computation.

Table 1. Evaluation of Projects

Table I. Evaluation of Projects with Unequal Cash Flow Using Payback		
Initial Cost \$15,000 Life (in years) 5		
Year	Annual Cash Flow	Cumulative Cash Flow
1	\$2000	\$2,000
2	4000	6,000
3	6000	12,000
4	7000	19,000
5	3000	22,000

(Source: Osteryoung, 1979)

The cumulative cash flow in any year is the summation of the prior year's cumulative total and the annual cash flow for the current year. The initial cost for this project was \$15,000, which is not clearly identified as a cash flow. Therefore, to find the payback, a bracket must be identified where \$15,000 falls in. In this case, the initial outlay of \$15,000 falls between \$12,000 and \$19,000. As a result, the payback time for this project will be 3 years and a fraction. To compute the fraction, the difference between \$15,000 and \$12,000 (\$3,000) will be divided by the next cash flow, which is \$7,000. The fraction then results in a value of 0.43. The final payback period is 3.43 years.

Calculating payback is a very simple method. Smaller firms whose budgets are limited are more prone to use the pay-back method based on its simplicity. However, the pay-back method does not account for additional cash flows after the payback period, which neglects including the value of the additional cash flows in the decision-making process. Another disadvantage of the payback method is that it neglects the relationship of timing and yields. Some projects may have a smaller yield during the

initial years while others have significant returns during the same time. Even if the payback period is identical for both projects, the influx of cash is completely different.

d. Inflation and Discount Rates

One of the most difficult challenges in using quantitative methods to determine the feasibility of capital investment projects is to accurately determine inflation and discount rates over the life of a project.

Drury and Tayles in their article "Misapplication of Capital Investment Appraisal Techniques," observe: "Firms are guilty of rejecting worthwhile investments because of the improper treatment of inflation in the financial appraisal. Inflation affects both future cash flows and the cost of capital that is used to discount the cash flows." Cash flows can be expressed in real terms (today's current purchasing power) and nominal terms (purchasing power at the time the cash flow occurs). Therefore, inconsistency in using nominal versus real terms can lead to miscalculations of the real value or benefits of a project. As a result, the NPV of projects can be understated or overstated. Long term projects are most susceptible to mismatching of inflation because failing to include inflation in cash flows estimates compounds with time.

In other cases, some cash flows do not fully adjust with the general rate of inflation or simply do not adjust at all. For example, lease payments and fixed price purchase or sale contracts do not change with the inflation rate. Therefore, to convert future cash flows to real cash flows they must be deflated by the general rate of inflation.

Another area of concern when dealing with inflation is the effect on the cost of capital. Investors normally require a higher return to compensate for inflation. The following example was presented by Drury and Tayles in the 1997 article: "Assuming that investors require a return of 10 percent in the absence of inflation then for each pounds 100 invested they will require a return of pounds 110. If the anticipated general rate of inflation is 5 percent then to maintain the return of pounds 110 in real terms this return will have to grow by 5 percent to pound 115.50. Therefore, a real rate of return of 10 percent requires a nominal return of 15.5 percent when the expected rate

of inflation is 10 percent.” In addition to inflation, the discount rate is another area where potential errors can occur in regards to the calculation of a project’s cash flows.

If a project is mainly financed by equity capital, then the assumption is that its cost of capital is equal to the return that would otherwise have been available from investing the money in the capital market. The assumption is that investors adjust for differences in risk between securities by changing the rate at which they discount expected cash flows. The greater the risk, the higher the required rate of return will be.

The most common framework that establishes the relationship between risk and return is the capital asset pricing model (CAPM). “According to the CAPM theory, investors determine their required return by adding a risk premium to the interest rate of a virtually risk free security, such as a government bond” (Drury & Tayles, 1997). The relative sensitivity of the returns on a firm’s securities with the returns from the stock market index represents an individual security risk measure. This measure is the beta coefficient.

The formula that delineates the required rate of return is as follows:

$$\text{RRR} = \text{Risk Free Rate} + (\text{Risk Premium} * \text{Beta})$$

If this expected return does not meet or beat the required return, then the investment should not be undertaken.

e. Computer Modeling and Capital Budgeting

Among the many benefits technology has brought about, simulation modeling is one of the applications beneficial to capital budgeting. Computer modeling has become one of the most important tools in an attempt to close the gap between theory and application. When considering capital budgeting, “Special attention must be paid to the timing of receipts and outlays; and the handling of fixed and variable costs, accounting depreciation, working capital, interest expense and opportunity costs” (Harris, 1982). In capital budgeting, projects are evaluated by considering the incremental cash flows resulting from the investment. There are two specific aspects to consider when working with cash flow projections: the investment decision (which projects to undertake) and the financing decision (how will the projects be financed). Computer

modeling can include many of the theoretical implications while integrating real life investment factors and financing decisions. The model can be established to dynamically show transformations over the life of the project as a result of economic changes, like changing market rates or declining asset usage. Furthermore, a firm's ending cash balance comparisons can be included with and without the project. Modeling is very useful in cash flow projection. The models can help eliminate some of the theoretical uncertainties of net present value analysis.

Harris (1982) states: "There are six steps involved in developing and using a computer model when analyzing capital projects: 1) Define the model, 2) gather information, 3) develop the baseline forecast, 4) evaluate the baseline forecast, 5) perform a sensitivity analysis, 6) evaluate capital expenditures."

As described by Harris, the first step in building a capital project model is to define the model. In defining the model, the following relevant factors should be included: 1) level of complexity, 2) list of inputs, 3) list of desired outputs, 4) number of programs to be evaluated, 5) the extent of interactions and linkages between programs, and 6) financial information. The next step is to gather information. The amount of information to be gathered will be dependent on step one. The scope of the information can include financial, statistical, fiscal, budgetary, and demographic data. The third step is to build a baseline forecast. This forecast includes two phases. One of the phases covers the estimated demand for the capital asset and estimated usage, while the other encompasses the financial forecasts associated with such demand. Once the baseline has been established, step four will evaluate the baseline forecast. Evaluating the baseline consists of management reviewing the forecast's reasonableness, validity, and accuracy.

When evaluating the baseline, management must take into account trends in utilization, financial condition, profitability, required rate increases, and the attractiveness of the cash flows. Step five consists of performing a sensitivity analysis. Many firms use Excel-based applications, such as linear programming in Excel Solver, to produce a sensitivity analysis report. This report presents the marginal change or effect resulting from changing the variables' values within the model. Another approach to conducting a sensitivity analysis is to incorporate assumptions relating to capital

expenditures to assess the incremental effect on a capital program. The analyst can determine a possible distribution of outcomes by modifying exogenous assumptions (i.e., inflation rates) and assigning probabilities to the possible range of changes. Based on these outcomes, ranging from least probable to most probable, management can better prepare for offsetting those undesirable results. Harris observes that the last step is to evaluate capital expenditures. This step relates to modifying investment expenditures and the effects these changes have on possible outcomes.

Computer modeling offers speed and accuracy in simulating complex situations for capital budgeting. Additionally, modeling offers analysts a dynamic medium in which to assess many different and possible outcomes.

3. Capital Budgeting Guidelines

Like many organizations in the public sector, private firms have guidelines or “rules” that apply to the capital budgeting process. However, unlike the specific rules and laws that federal agencies (such as DOD) must follow when proposing capital investments, these guidelines are not “written in stone.” Essentially, the guidelines used by private firms exist for one purpose, and that is to help firms determine how to measure the value of capital investment projects. The decision criteria discussed above assumed that a capital project’s cash flows were known. In reality, estimating the cash flows associated with a particular capital investment project is a difficult process. Additionally, not all cash flows associated with a capital project are relevant in measuring its value. The guidelines detailed in the next several paragraphs help private firms measure the value of capital projects by defining relevant cash flows (Keown et al, 2005).

The first guideline is that private firms should use free cash flows rather than accounting profits to measure the value of capital projects. Accounting profits are “booked” when “earned,” which may or may not mean that the firm actually has “cash in hand.” Free cash flows from a project can be reinvested by the firm and they “...correctly reflect the timing of benefits and costs—that is, when the money is received, when it can be reinvested, and when it must be paid out” (Keown et al, 2005).

Another guideline is that firms must only consider the *incremental* cash flows associated with the acceptance of a capital project proposal. This requires firms to look at the company as a whole and determine after-tax cash flows both with and without the project. Additionally, incremental expenses must be considered. Will the purchase of new machinery require that employees receive additional training? If so, the cash flow associated with this training must be subtracted from the expected cash inflows of the new machinery (Keown et al, 2005).

Next, private firms must consider how the capital project will affect the cash flows from existing products and operations. For example, if a firm is considering the launch of a new product line, it must thoroughly analyze the expected effects (in terms of cash flows) this will have on their current product lines. Will the new product cannibalize sales from existing products or will the new product bring increased sales to existing products? Questions like these, as well as many others, must be answered before a new capital project is accepted (Keown et al, 2005).

Finally, private firms must remember to consider sunk costs and opportunity costs during the capital budgeting process. Sunk costs are cash flows that have already been spent on the project. For example, if a firm has already spent money for a market feasibility study of a new product, the cash flow associated with this expense is “sunk” and should not be included in the capital budgeting analysis. Opportunity costs are “...cash flows that are lost because a given [capital] project consumes scarce resources that would have produced cash flows if that project had been rejected” (Keown et al, 2005). For example, if a firm owns vacant land and builds a strip mall on it, the opportunity cost for the strip mall project is the forgone cash flows if the land had been used for some other purpose. Keown makes this final point about opportunity costs: “...opportunity cost cash flows should reflect net cash flows that would have been received if the project under consideration were rejected. Again, we are analyzing the cash flows to the company as a whole, with or without the project.”

4. Risk and Capital Budgeting

Capital budgeting requires financial managers to make decisions regarding the commitment of resources to courses of action that are normally very expensive.

Additionally, more often than not, these decisions are very costly and not reversible. To have successful outcomes in capital budgeting, managers must accurately anticipate future business and economic conditions. Risk, therefore, can be described as the delta between the decisions made and actual future outcomes. To deal with risk and choices in an appropriate and preferably objective, manner, management must evaluate all capital investment proposals as rigorously as possible. As the volatility of the business environment increases, those firms who are best able to navigate these uncertainties will prove to be the most successful in the long run.

In evaluating capital budgeting decisions, financial managers must carefully identify and qualify financial risks. Two main considerations financial managers must take into account are:

1. Are they aware of all future states of the economy, business, and market trends?
2. Are they able to place a probability and value on each of those states?

To better understand how managers evaluate or attempt to answer these questions, several terms must be defined. Clark et al (1989) highlight five specific types of risks: business, investment, portfolio, cataclysm, and financial. These risks are defined by Clark et al as follows:

Business risk is the variability in earnings that is a function of the firm's normal operations (as impacted by the changing economic environment) and management's decisions with respect to capital intensification. It should be noted that business risk considers only the variability in Earnings Before Interests and Taxes (EBIT).

Investment risk is the variability in earnings due to variations in the cash inflows and outflows of capital investment projects undertaken. This risk is associated with forecasting errors made in market acceptance of products, future technological changes, and changes in cost related to projects.

Portfolio risk is the variability in earnings due to the degree of efficient diversification that the firm has achieved in its operations and its overall portfolio of assets.

Cataclysm risk is the variability in earnings that is a function of events beyond managerial control and anticipation.

Financial risk is the variability in earnings that is a function of the financial structure and the necessity of meeting obligations on fixed-income securities.

Based on the many risks described above, managers must draw from a group of alternatives to quantify the risks they face. Statistical methods and simulation are two of the most widely-used approaches to determine risk probabilities and values.

Statisticians have presented both the absolute and relative measures of risk. Absolute measures of dispersion include the range, mean absolute deviation, variance, standard deviation, and semi-variance. The relative measure of dispersion is simply the coefficient of variation. Each measure has a unique equation to determine its value. Additionally, all of these measures present high and low benchmarks against which to compare and determine the risk of the investment. Table 2 is an example of a comparative chart using the various statistics measures.

Table 2. Comparison of Expected Return and Risk for Three Investment Alternatives

Table II. Comparison of Expected Return and Risk for Three Investment Alternatives			
	Investment A	Investment B	Investment C
Expected Return	\$1,450	\$1,280	\$1,580
Range	\$1,000	\$600	\$1,100
Mean Absolute Deviation	\$260	\$192	\$272
Variance	\$122,500	\$49,600	\$145,600
Standard Deviation	\$350	\$223	\$382
Semivariance	\$84,500	\$18,880	\$92,480
Coefficient of Variation	0.2414	0.1742	0.2418

(Clark et al, 1989)

Once the measures have been computed, a comparison and interpretation must be done among all the possible investments and the correlations of the measures to

determine which alternative is the best overall. The absolute statistical measures provide valuable insight with regards to risk. Mainly, the relative measure of dispersion or coefficient of variation indicates the level of risk per dollar of expected return. Lower coefficients of variation translate into lower risk.

Another statistical technique utilized in determining financial risk is the use of decision trees. “A decision tree is a formal representation of available decision alternatives at various points through time which are followed by chance events that may occur with some probability. A ranking of the available decision alternatives is usually achieved by finding the expected returns of the alternatives” (Clark et al, 1989).

When using decision trees, analysts may include considerations such as the state of the economy, probability of the state of the economy, expected returns, etc. Decision trees are mainly used when selecting from various projects as opposed to selecting the best avenue to execute one project over time.

Simulation is another method to evaluate risk. As Keown and his associate stated, simulation is “the process of imitating the performance of an investment project under evaluation using a computer. This is done by randomly selecting observations from each of the distributions that affect the outcome of the project, combining those observations to determine the final output of the project, and continuing with this process until a representative record of the project’s probable outcome is assembled.” Simulation brings together statistical data such as observations from probability distributions to calculate the net present value or internal rate of return of a project or projects. The process can be repeated as many times as necessary until a good representation of future possible outcomes is achieved.

5. Incorporating Risk into the Capital Budgeting Process

Not all projects can be treated equally in regards to risk. Each investment project has its unique level and type of risk. Therefore, to properly incorporate risk into investment analysis, two methods have been developed. These two methods are the certainty equivalent approach and the risk adjusted discount rate.

In the 1980s, the concept of certainty equivalent was described as follows: “The certainty equivalent method permits adjustment for risk by incorporating the manager’s utility preference for risk versus return directly into the capital investment process” (Clark et al, 1989).

This concept has remained consistent in its purpose throughout time until the present. Keown et al presents a more updated definition: the certainty equivalent approach involves a direct attempt to allow the decision maker to incorporate his or her utility function into the analysis. This approach allows the financial manager to substitute a set of equivalent riskless cash flows for the expected cash flows. Subsequently, these cash flows are discounted back to the present using the NPV criteria. Once the calculation is completed, the project with a net present value equal to or greater than zero is selected. While this approach accounts for the utility factor, it can be an arbitrary approach. Two different financial managers can look at the same project with different riskless rates. Therefore, if presented with this situation which of the two managers is correct? In reality, both managers could be right since the riskless measure is based on a relative assessment as opposed to a hard factual guideline. This approach is not widely used because of the potential bias that can stem from the “riskless” assessment.

The next approach is the risk adjusted discount rate. The definition used in the 1980s was: “The rationale underlying the use of the risk-adjusted discount rate (RADR) technique is that projects which have greater variability in the probability distributions of their returns should have these returns discounted at a higher rate than projects having less variability of risk.” The RADR concept concentrates on the variability of risk. Therefore, it adjusts the discount rate to accommodate greater or lesser risk. Likewise, today’s approach to this method focuses on the same principle. “A method for incorporating the project’s level of risk into the capital-budgeting process, in which the discount rate is adjusted upward to compensate for higher than normal risk or downward to adjust for lower than normal risk” (Keown et al, 2005).

The method of risk adjusted discount rates seems more plausible when incorporating risk into capital budgeting for two reasons. First, financial analysts should

consider the stakeholders reactions to new investments if the risk associated with them is different than the firm's typical risk. Second, adjusting the discount rate upward or downward accounts for the variability of returns based on risk.

The most significant difference between the two methods hinges on the point at which the adjustment for risk is incorporated into the calculations. Also, the risk adjusted discount rate makes the implicit assumption that risk becomes greater as time windows expand.

Based on the many risks described above, managers must draw from a group of alternatives to quantify the risks they face. Statistical methods and simulation are two of the most widely-used approaches to determine risk probabilities and values.

The previous discussion has ignored the role of risk and uncertainty in private sector capital budgeting. In fact, even when firms use the criteria and guidelines detailed above, the cash flows used in their analysis of a capital project are only estimates of "...what is *expected* to happen in the future, not necessarily what *will* happen in the future" (Keown et al, 2005). However, even though private firms can not know with 100% certainty what cash flows will result from investing in any particular capital project, they can estimate a range of probabilities for the cash flows. Likewise, private firms will have to make estimates on interest rates related to their future costs of capital.

The more common method the private firms use for incorporating risk is through risk adjusted discount rates. The use of this method is "...based on the concept that investors demand higher returns for more risky projects" (Keown et al, 2005). In this process, the discount rate used in the NPV criterion is adjusted upward or downward in accordance with the level of risk inherent in the capital investment under consideration. If a capital project is determined to be riskier than normal, the discount rate is adjusted upward. If the level of risk for the project under consideration is higher than the firm's "typical" project, then management must assume that the firm's shareholders will demand a higher rate of return for taking on this additional risk. By appropriately adjusting the discount rates for the risk level of the project under consideration, the firm

can ensure to the best of their ability across a portfolio of projects that their capital budgeting analysis will yield projects that increase the profits of the firm and ultimately increase shareholder value (Keown et al, 2005).

III. CASE STUDIES

A. INTRODUCTION

It is useful to look at other countries and public organizations that already use private sector practices to determine if these practices are appropriate for use in the Department of Defense (DOD). In this section public organizations that have applied private sector principles will be examined. Specifically, the performance budgeting of New Zealand, the similar accrual output budgeting of Australia, and the capital budgeting process of California will be discussed. How these practices are working for those countries/states will also be briefly discussed.

B. NEW ZEALAND

Since 1989, the New Zealand government has completely restructured its management practices and structures. New Zealand has applied many practices common in the private sector such as performance budgeting and accrual accounting. Before 1984, the economy was under tight control and the financial sector focused on complying with rules and regulations. The public and private sector were clearly separated by the way business was conducted. In 1984, a comprehensive reform process was introduced by a newly-elected government. The focus was not only on budget reform, but also management reform. The two were not separate projects, but part of an overall integrated reform of the public sector (Smith, 1999).

It is necessary to define some terms before discussing New Zealand's public sector practices. First, New Zealand uses a Westminster form of government in which a ruling party is declared as the government and budgets presented to Parliament are always passed. The only other approval needed is that of the Governor General and the chances of disapproval are very low (Smith, 1999). Also, New Zealand makes a distinction between outputs and outcomes. According to Smith, the Public Finance Act of 1989 Sec 2 (1) defines outcomes as "the impacts on, or the consequences for, the community of the outputs or activities of Government." It defines outputs (Sec 2 (1)) as "the goods and services, produced by a department Crown agency, Office of Parliament

or other person or body.” So, basically, outcomes are what happen to the public and outputs are physical products or services produced by the government.

One of the most important steps under management reform was to reduce the isolation of the public sector from the public, so the public’s needs could be better and more quickly addressed. The State Sector Act in 1988 helped address this issue. The purpose of this act was to define the accountability of Parliament, Cabinet Ministers, and department heads (Smith, 1999). New Zealand also changed from a top-down structure for decision making, so as to allow department heads to make more timely decisions. Since department heads have closer contact with the situations that require decisions to be made, it is appropriate for them to make the decisions. The desired outputs and resources are determined and agreed to by both the department head and the Minister on an annual basis. Then, department heads are evaluated annually to determine if they are meeting the agreed upon goals. Since the department heads are not tenure positions, they are motivated to meet these goals (Smith, 1999).

The State Sector Act of 1988, along with the Public Finance Act of 1989, has changed the emphasis from scrutinizing line items to looking at the processes that are used to produce outputs which will achieve desired outcomes. The Public Finance Act of 1989 “linked appropriations to departmental budgets in terms of planned outcomes” (Smith, 1999). Instead of basing the use of money on how much was available, department heads could now plan what outcomes they wanted to accomplish, what outputs were necessary to make those outcomes occur, and the budget request, to include spending for capital assets, would be based on these numbers.

Because of the authority delegated to the department heads, they are authorized to shift appropriation mixes without seeking legislative authority as long as they do not exceed the total budget appropriation approved by Parliament. Department heads can also purchase other capital assets using appropriations set aside for depreciation and sell assets to raise working capital as long as they do not change their total assets. This way, department heads have more discretion over their resources as long as they meet the predetermined output goals (Smith, 1999).

New Zealand Ministers monitor effectiveness and efficiency by comparing planned to actual performance on an annual basis. They measure the actual outputs of each department and the costs incurred, and see how well they match what was planned. The ability to plan cost accurately is vital if this method is used to measure effectiveness and efficiency. The treasury has required disclosing and documenting their costing policies and has provided the following guidelines for doing so (Smith, 1999):

- Must formalize and document cost accounting policies, including any changes.
- Formally state how they distinguish between direct and indirect costs.
- Apply direct and indirect costs to outputs.

The success of New Zealand's reform is not based only on the new financial reporting and streamlined appropriations. One of the most important changes was focusing on management issues and giving department heads more control over their funds (i.e., decentralized decision making). By determining outputs goals annually and allowing the department heads the flexibility to run their departments more like private businesses, allowing them to determine which assets to purchase and what funds to use for those purchases, and basing evaluation on their performance of achieving their goals, the New Zealand government can more effectively and efficiently run the country.

C. AUSTRALIA

Before the late 1990s, most of Australia's governments presented annual budgets to Parliament on a modified cash basis. Then they adopted New Zealand's "accrual output budgeting" (AOB). Prior to this change, financial control was achieved by placing a ceiling on departmental expenditures (i.e., spending caps). Each department had an appropriation for both current expenditures as well as capital expenditures and could not move funds between the two (Robinson, 2002). The departments could sell their capital assets, but any funds received had to be turned over to the Treasury (Robinson, 2002).

The two appropriation categories have been replaced with three appropriation categories like New Zealand's. One is the payments for outputs, which represents the amount the government pays that department for the services it provides. The second is the equity injection appropriation. This is similar to the funds that shareholders provide

to a private business. The last is the payments for administered expenditures appropriation, which covers expenses that the department has no control over or accountability for (Robinson, 2002).

Under AOB, the departments have two ways to fund for capital assets. They can use the equity injection appropriation or own-source funds. Funded depreciation is included in the payments for outputs appropriation, and this can be used for capital expenditures because they do not involve payments now or in the future. Since the departments retain the surplus for future years if they spend less on capital assets than the amount of funded depreciation they received, they are partially responsible for maintaining their capital base. However, departments do need Treasury approval to draw on accumulated depreciation resources (Robinson, 2002).

Departments can also obtain funding by selling assets. The department can use funds obtained by selling its assets at its own discretion and does not require any approval from the Treasury. To make capital asset purchases more transparent, the annual report to the Treasury now requires that each department divulge all capital asset purchases and the source of funding for each. This way, the Treasury can have a better idea of whether the assets are being funded by equity injections or own-source funding (Robinson, 2002).

Australia has found that there are still many issues of concern with respect to the application of these new financial procedures. Many public officials find the rules too complex. To some extent, they also think that transparency and accountability have been lost. Additionally, the departments, agencies, and auditors question whether the increased performance will ever outweigh those losses. Departments are also upset over the conflicting roles they have to play. On one hand they are expected to act like businesses and should have the ability to make decisions concerning asset acquisition, but on the other hand, they are closely monitored and controlled when they do try to use their own funds (Robinson, 2002).

D. STATE CAPITAL BUDGETS

A 1986 survey found that 42 states have capital budgets and six show capital in separate line items. Some states have separate capital appropriation bills. However, the survey showed that no state has an entry for depreciation. Small projects generally have capital spending appropriated entirely in advance, while larger projects are appropriated in stages. The financing for the projects is through federal grants, borrowing, general fund taxes, or special fund taxes (Hush 1988).

By taking a closer look at California's capital asset budgeting process, it can be seen that California has separate capital appropriations in the budget. The departments are responsible for determining the projects (assets) needed based on their strategic plan. Individual departments must also prepare five-year capitalized asset plans and may work with the Pooled Money Investment Board (PMIB) and the State Treasurer's Office (STO) to obtain short or long-term financing with debt (California State Administrative Manual, 2004).

Based on this information, the departments propose individual projects and prepare a capital budget. The Department of Finance (DOF) may request changes or ask the Department of General Services to determine if the projects are practical. The governor makes the ultimate decision as to which projects will be included in the governor's budget based on input from the three organizations. Then, the overall capital budget is formally presented to the Legislative Analyst's Office (LAO) and the legislative staff. After the approved bill is sent to the governor, the governor may veto items before signing. One exception that should be noted is that the transportation projects are approved by category instead of by individual project (Public Policy Institute of California, 2000).

Most projects use the design-bid-build process, so projects are usually budgeted in multiple phases. If a project is going to go over its budget, the DOF can reduce the scope, augment the project up to 20 %, delay the project, or terminate entirely. Also, funds can not be transferred between projects and appropriations are only available for expenditure for three years (California State Administrative Manual, 2004).

A few issues can be noted based on using this process. First, there is little statewide planning. California does well planning for individual projects, but not as well for statewide overall coordination. This hinders the ability to make tradeoffs across departments or regions. Second, there is no matching to overall goals. California does not necessarily invest in assets to meet its policy goals, but invests in assets that will help balance the short-term budget. California determines which programs (assets) to fund based on the funding that is available (often using long-term debt) instead of focusing on what will be needed in the future (Public Policy Institute of California, 2000).

IV. RECOMMENDATIONS AND CONCLUSIONS

A. RECOMMENDATIONS

This research examined the capital budgeting practices and principles used in both public and private sector organizations. Additionally, case studies of public organizations that employed private sector capital budgeting methods have been presented. The case studies presented above can provide valuable insights for consideration to the Department of Defense (DOD) and most federal agencies. The Government Accountability Office (GAO), President Clinton's Commission to Study Capital Budgeting (PCSCB), and others performed similar studies to those detailed above which resulted in several proposed improvements to the current system of capital budgeting in the federal government. The following discussion guided by the author's own observations as well as the proposals from GAO and others, will highlight those insights that have application value for DOD and other federal agencies.

First, as demonstrated in New Zealand, if budget reforms are going to be made, management reforms must be made simultaneously to ensure the reforms are properly implemented and all persons involved are aware and able to make the appropriate changes. This is especially true if one of the reforms is decentralizing the decision-making process. Decentralizing the decision-making process could prompt the use of performance budgeting, where departments are rated (and rewarded) on their success of reaching predetermined goals. Authority for capital asset purchases could be shifted down to the department level (i.e., DOD would decide which assets to buy) instead of Congress holding virtually all decision-making authority. Even though SECDEF Rumsfeld's request for "broadened discretionary powers" in the Defense Transformation Act (DTA) was denied by Congress, his ideas have considerable merit since the departments are the most closely involved with the day-to-day business they conduct (McCaffery and Jones, 2004).

Since federal agencies have much tighter constraints than businesses in the private sector, it is difficult to provide incentives for agencies to manage their assets. However,

along with continued use of the Bush Administration's Performance Assessment Rating Tool (PART), Congress could adopt policies similar to Australia and New Zealand and allow the agencies, including DOD, to raise and keep revenues from selling or renting out existing assets (President's Commission to Study Capital Budgeting, 1999). If good PART scores are rewarded in the budget process and agencies are allowed to keep revenues from the sale of assets, there are at least two incentives for agencies to manage their assets well.

If performance-based budgeting is used, the strategic plans of the departments could play a much larger role in the capital budgeting process. Although the Government Performance and Results Act (GPRA) requires agencies to submit five-year strategic plans, the plans are only prepared every three years and are currently not used in considering appropriation requests, which includes requests for capital spending. If a move towards performance budgeting and a more decentralized decision-making process was made, these plans would need to have results-oriented goals that could be measured, so that agencies could be rated on their performance (possibly via PART). For DOD, this would mean that the Future Years Defense Plan (FYDP), DOD's version of the agency capital plan, would play a larger role in the decision-making process regarding capital asset purchases. Also, the Office of Management and Budget (OMB) should evaluate the plans and Congress should use the strategic plans and OMB evaluation as decision-making tools when considering appropriation requests. Taking into account the considerable amount of time that most federal agencies spend preparing their strategic plans in accordance with GPRA, it seems reasonable to suggest that these plans be used for decision-making purposes.

Additionally, it would be useful for planning purposes if the strategic plans and budgets were tied to the life cycles of the capital assets. Although the Capital Programming Guide directs agencies to consider life-cycle costs and compare them to expected benefits, the life-cycle costs are not directly linked to the agency's strategic plans. If the capital asset's life-cycle costs were tied to strategic plans, funding for the maintenance and replacement of assets could be planned in advance. The plans should also include any future outlays for capital assets that are planned (such as land, buildings,

and new weapon systems). If a life cycle is estimated for an asset, then the department would know when it will be necessary to replace the item and this can be included in the plan. Therefore, even if there is no proposal or recommendation for the actual item that will replace the asset, funding needs can be more accurately forecasted (President's Commission to Study Capital Budgeting, 1999).

In an effort to assist agencies in making decisions on capital asset investments, the agencies should continue to prepare annual financial statements as required by the CFO Act. It should be noted, however, that preparation of financial statements simply for CFO compliance should not be the goal. The goal should be preparation of financial statements that are used to aid in better decision making. In addition, the agencies could prepare detailed breakdowns of existing capital assets. The information in these reports would then be consolidated by OMB and used to assist the agencies in preparing long-term capital plans, similar to DOD's FYDP, as well as to assist OMB in reviewing and assessing those plans (President's Commission to Study Capital Budgeting, 1999). A long-term view that includes consideration of existing capital assets should further improve the decision-making process.

Most states have separate capital budgets. Analysis of the case study on state capital budgets prompts the question of if there should be a separate capital budget at the federal level. While there are many critics of a separate capital budget at the federal government or agency level, there has been a proposal for instituting separate capital acquisition funds (CAF) at the agency level. A segment of the agency's appropriations would be placed in the CAF and could only be used for acquiring large capital assets. The CAF would borrow from the Treasury and charge operating units rent equal to the amount of debt service. Additionally, the CAF would inherit all of the agency's existing capital assets in an effort to capture all agency costs of capital. Separate funds for capital acquisition should help agencies better plan and budget for capital assets. The agencies could then be held accountable for planning and budgeting and, presumably, would be more likely to use their resources efficiently. These funds would also smooth out the budget authority required by agencies and would help to reduce potential spikes in the budget associated with full funding requirements. An important aspect of introducing

separate capital acquisition funds, however, is the definition of capital assets. OMB would have to issue guidance on what constitutes a capital asset to ensure implementation is consistent throughout the agencies (President's Commission to Study Capital Budgeting, 1999).

While the Government Accountability Office (GAO) originally agreed with and supported the President's Commission to Study Capital Budgeting recommendation to implement capital acquisition funds, they have recently published a study stating that the proposed benefits of CAFs can be achieved through simpler means (GAO, 2005).

GAO states that CAFs, as a financing mechanism for federal capital assets, would ultimately increase management and oversight responsibilities for the Treasury Department, the Office of Management and Budget (OMB), the Congressional Budget Office (CBO), and the departments and agencies that would utilize CAFs. While recognizing that CAFs might improve decision-making and remove (for the most part) spikes in Budget Authority (BA) associated with large dollar capital assets, GAO states that some federal agencies are using different approaches that address these problems through much simpler means (GAO, 2005).

The federal agencies that GAO studied are using asset management systems which are allowing them to assess the condition of existing capital assets, estimate funding levels for maintaining these assets, and assign priorities to maintenance and improvements for capital assets. Other agencies are currently using cost information from their accounting systems to assist in the agency's budgeting decisions. However, additional improvements in agency cost accounting systems is needed before they can fully inform the agency's capital planning and budgeting decisions (GAO, 2005).

GAO's study of several capital-intensive federal agencies, coupled with several interviews with officials from Congress, Treasury, and OMB, has led them to conclude that CAFs, as they had been proposed by the President's Commission to Study Capital Budgeting, are too complicated for implementation because of the additional budget complexities that they create. Additionally, interviews with executive and congressional officials led GAO to believe that a proposal to institute CAFs, even on a pilot basis,

would have few, if any, proponents. Because of these reasons, GAO recommends that the focus should be placed on improvement and widespread implementation of asset management and cost accounting systems to address the problems that CAFs were proposed as a solution for (GAO, 2005).

Spending caps could be placed on capital spending to encourage decision makers to set priorities and make tradeoffs, which could result in capital spending that provides the most benefit. This could be done in the context of re-instating the Budget Enforcement Act spending caps that have expired. With spending caps, decision makers would focus resources on achieving the long-term objectives and spend capital dollars on the most cost-effective assets (President's Commission to Study Capital Budgeting, 1999), much like what is common practice in private sector organizations. Agencies will also ensure that capital assets invested in are required to accomplish their mission as defined by their strategic plan.

While spending caps encourage efficient trade-off decisions, when combined with the current full-funding requirements, spending caps can lead to a bias against capital projects in the budget process. However as previously noted, full funding in the current budget process is important for controlling acquisition costs and ensuring adequate resources to operate and maintain capital assets. Although there seems to be incompatibility between spending caps and full-funding, GAO has identified strategies that have been successfully used by selected agencies to accommodate capital spending within the current budget controls imposed by Congress (Posner, 1998). These strategies take into account the presumed reluctance of Congress to approve separate capital budgets, capital acquisition funds, or decentralized decision-making at the agency level.

The use of revolving funds and/or savings accounts, as endorsed by GAO, would allow agencies to accumulate the resources needed to satisfy full-funding requirements within the constraints of the current unified budget. Revolving funds allow the agency to charge user fees (similar to CAFs and the process in New Zealand) in order to help accumulate the funds necessary to operate and replace capital assets. Revolving funds would also incorporate the use of depreciation to help set user rates. Savings accounts could be designed to achieve the same goals. However, users would "make voluntary

contributions according to an established schedule for prospective capital purchases, rather than being charged retrospectively for capital usage” (Posner, 1998). Both revolving funds and savings accounts would hopefully encourage managers to plan more effectively for capital asset purchases while enabling the agency to build up over time the needed money to fully fund capital acquisitions. It should be noted though that if DOD wanted to adopt either of these strategies, they would have to convince Congress that DOD has the ability to effectively plan for capital acquisitions and has the financial management controls in place to achieve success (Posner, 1998).

B. FUTURE AREAS OF RESEARCH

This research has excluded analyses of the impact of improved information technology (IT) systems on the capital budgeting process in federal agencies and the federal government. The Department of Defense (DOD) and other federal agencies have recently made great strides in the reduction of redundant systems as well as improving the communication between IT systems. Many of these IT systems are used to track and manage agency capital assets. Future research could include a detailed analysis of the impact of these IT improvements on the capital budgeting processes of federal agencies.

Another area of future research could include an analysis of the feasibility of monetizing defense assets. As this research presented, it is difficult, if not impossible, to monetize the benefits of defense weapons systems. Future research could explore alternative methods of conducting cost-benefit analyses with defense weapons systems and examine the feasibility of implementing such methods within DOD.

Future research could also analyze the extent to which changes in the Federal Acquisition Regulations (FAR) have contributed to or detracted from effective capital budgeting in DOD and other federal agencies. This research could include an in-depth analysis of the cost-estimating methods employed by federal acquisition professionals. Given the increasing Congressional scrutiny of high-dollar defense acquisitions and the tendency for many of these programs to experience cost overruns, an analysis of current cost-estimating procedures seems warranted. Accurate and reliable cost-estimating procedures are critical to effective capital budgeting.

Finally, future research could examine the effects of other defense reform initiatives on the capital budgeting/programming process. DOD's renewed focus on best practices and improvement of business systems could have a significant impact on the budgeting process.

C. CONCLUSIONS

Capital spending is clearly important to the nation due to the long term benefits provided by the assets acquired. In the case of DOD, the benefits provided by capital assets like ships, aircraft, and tanks are necessary to provide for our nation's defense. However, if the current trend of shrinking discretionary budgets and increased spending on entitlements continues, trade-off decisions between capital spending and current spending will become increasingly difficult to make. Additionally, the current practices of DOD and the federal government are clearly less than perfect and often lead to capital asset expenditures that are not as efficient or as effective as needed. Obviously, if discretionary dollars continue to be limited and the current budgeting practices are leading to inefficient and ineffective use of capital dollars, something needs to change.

This research has identified several actions that could be implemented in the capital budgeting processes of DOD and other federal agencies. However, many of the recommendations mentioned above require changes at the agency level, at the federal government level, and changes to the law. Budgeting changes at the federal government level would certainly require Congressional and Executive commitment if any progress is to be made. Some of the recommendations presented above would require Congress giving the federal agencies more control of their budgets and there has been very little Congressional interest in sharing their "power of the purse." The result has been efforts, in the form of laws and regulations, mandating federal agencies to be more efficient in their use of resources with an emphasis in becoming more "business-like."

Recent efforts by DOD and other Federal agencies have improved conditions to some degree. Several foreign governments and many states have been successful in implementing capital budgeting practices that are prevalent in private sector companies. Likewise, DOD and other Federal agencies have instituted some of these same practices. However, more progress needs to be made. More research should be done and serious

commitments need to be made from Congress and federal agencies to improve our budgeting processes. The American taxpayers deserve, and should demand that federal dollars are used efficiently and produce results.

The overall purpose of this research was to examine the capital budgeting principles used in DOD and private organizations, look at case studies of public organizations that use private sector budgeting methods, and determine the feasibility of adopting some of these methods within DOD and other federal agencies. Thorough examination of private sector capital budgeting practices in states and other countries coupled with proposals made by the PCSCB, GAO, and others, reveals valuable insights into what changes may be needed. Development, expansion, and implementation of those ideas presented in this paper can improve the current capital budgeting processes in DOD, other agencies, and throughout the federal government.

LIST OF REFERENCES

- Bierman Jr., H., & Smidt, S. (1980). *The Capital Budgeting Decision* (5th edition). New York: MacMillan Publishing Co., Inc.
- California State Administrative Manual (n.d). Retrieved March 15, 2005 from <http://sam.dgs.ca.gov/default.htm>.
- Cooper, W., Morgan, R., Redman, A., & Smith, M. (2002). Capital Budgeting Models: Theory vs. Practice, 26(1/2). Retrieved May 8, 2005 from <http://proquest.umi.com/pqdweb?index=0&did=636769801&SrchMode=1&sid=2&Fmt=4&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1130189677&clientId=11969>.
- Drury, C. & Tayles, M. (1997). *The Misapplication of Capital Investment Appraisal Techniques*. Management Decision, 35(2). Retrieved July 17, 2005 from <http://proquest.umi.com/pqdweb?index=0&did=117543017&SrchMode=1&sid=1&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1130188340&clientId=11969>.
- General Accounting Office [GAO]. (1998) Executive Guide. Leading Practices in Capital Decision Making. Retrieved September 12, 2005 from <http://www.gao.gov/archive/1998/ai98110.pdf>.
- General Accounting Office [GAO] (2005) Capital Financing. Potential Benefits of Capital Acquisition Funds can be Achieved through Simpler Means. Retrieved September 12, 2005 from: <http://www.gao.gov/new.items/d05249.pdf>.
- Graham, J. & Campbell, H. (2002). *How do CFOs make Capital Budgeting and Capital Structure Decisions?[Electronic Version]*. Journal of Applied Corporate Finance, 15, 8-23. Retrieved July 23, 2005 from http://faculty.fuqua.duke.edu/~charvey/Research/Published_Papers/P76_How_do_CFOs.pdf.
- Harris, J. (1982). *Computer Modeling*. Healthcare Financial Management: Journal of the Healthcare Financial Management Association, 36(6), 10-18.
- Hush, L. & Perof, K. (1988). The Variety of State Capital Budgets: A Survey: Public Budgeting & Finance. 8(2), 67-80.

- Jog, V. & Srivastava, A. (1994). *Corporate Financial Decision making in Canada*. Revue Canadienne des Sciences de l'administration. 11(2). Retrieved July 24, . 2005 from
<http://proquest.umi.com/pqdweb?index=28&did=44078&SrchMode=1&sid=7&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1130274611&clientId=11969>.
- Jones, L.R. & Thompson, F. (1999). *Institutional Renewal for the Twenty-first Century*. Stanford: JAI Press.
- Keown, A., Martin, J., Petty, J., & Scott Jr., D, (2005). *Financial Management Principles and Applications*. (10th ed) New Jersey: Prentice Hall.
- McCaffery, J. & Jones, L. (2004). *Budgeting and Financial Management for National Defense*. Greenwich: Information Age Publishing.
- Office of Management and Budget. [OMB]. (2003) *Circular No. A-11: Preparation, Submission, and Execution of the Budget*. Retrieved May 20, 2005 from:
http://www.whitehouse.gov/omb/circulars/a11/current_year/a_11_2003.pdf.
- Office of Management and Budget. [OMB]. (1992) *Circular No. A-94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*. Retrieved May 20, 2005 from: <http://www.whitehouse.gov/omb/circulars/a094/a094.html>.
- Office of Management and Budget. [OMB] (1997) *Capital Programming Guide: Supplement to OMB Circular A-11, Part 3: Planning, Budgeting, and Acquisition of Capital Assets*. Retrieved May 20, 2005 from
<http://www.whitehouse.gov/omb/circulars/a11/cpgtoc.html>.
- Osteryoung, J. (1979). *Capital Budgeting, Long Term Asset Selection* (2 ed). Columbus Ohio: Grid Publishing Inc.
- President's Commission to Study Capital Budgeting. (1998, January 30). *Statement of Michael B. Enzi before the President's Commission to Study Capital Budgeting*. Retrieved June 3, 2005 from: http://clinton3.nara.gov/pcscb/wt_enzi.html.
- President's Commission to Study Capital Budgeting. (1998, March 6). *Statement of Paul L. Posner before the President's Commission to Study Capital Budgeting*. Retrieved June 3, 2005 from: http://clinton4.nara.gov/pcscb/wt_posner.html.
- Public Policy Institute of California. (1992) *How does California Make Its Infrastructure Decisions?*. Retrieved June 3, 2005 from:
http://www.ppic.org/content/pubs/RB_600MNRB.pdf.
- Report of the President's Commission to Study Capital Budgeting. (1999). Retrieved June 3, 2005 from: <http://clinton3.nara.gov/pcscb/report.html>.

- Robinson, M. (2002). Financial Control in Australian Government Budgeting. *Public Budgeting & Finance*. 22(1), 80-94.
- Ryan, P. & Ryan, G. (2002). *Capital Budgeting Practices of the Fortune 1000: How have things changed?* *Journal of Business and Management*. 8(4). Retrieved July 17, 2005 from <http://proquest.umi.com/pqdweb?index=0&did=331635391&SrchMode=1&sid=7&Fmt=4&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1130190815&clientId=11969>.
- Satya, P. & Puja, G. (2004). *How Close are NPVI and IRR as Criteria for Project Choice in Real Life?* *Finance India*. 18. Retrieved July 17, 2005 from <http://proquest.umi.com/pqdweb?index=14&did=842824341&SrchMode=3&sid=1&Fmt=4&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1130274156&clientId=11969&aid=1>.
- Smith, G. & Jacobs, K. (1999). New Zealand: The Dynamics Behind a Reinvented Government. *International Journal of Public Administration*. 22(2).
- Tresch, R. (2002). *Public Finance a Normative Theory* (2nd ed). San Diego: Academic Press.
- Van Horne, J. (1989). *Fundamentals of Financial Management* (7th ed). New Jersey: Prentice Hall.
- Zeller, T. & Stanko B. (2005). How Risky Are Your Capital Expenditures. *Strategic Finance*. 86(8), 44-49.

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